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Magasool

Audit of Chennai Waterways – A Citizen's Report

Is Chennai ready to face the upcoming monsoon?

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Contents

Executive Summary

The study on waterbodies involved 2 stages. The first is the preliminary research carried out with maps from 1954, 1972 and 2016. The second is the social audit of specific high flooded areas such as Mugalivakkam, Villivakkam, Pallikaranai and Pallavaram. Around 150 local residents and volunteers have participated in the social audit.

Preliminary research on Waterways with GIS mapping of the waterbodies from 1954 to now has clearly shown the level of indiscriminate destruction of waterbodies carried out in the name of development. A lot of lakes like Villivakkam and Ambattur have shrunk more than 80% in size over the last 50 years. The elevation mapping of the areas, along with the lost or poorly maintained lakes and canals clearly establish the links to why each of these areas were heavily flooded last December.

The social audit of those specific stretches that were heavily flooded clearly shows that the Government has been the major contributor to the destruction of waterbodies which has been the primary cause for the floods. Governments in fact have built right on a waterbody like the Villivakkam lake where pumping stations are built by Metro water; and the lake is being covered with debris from Metro rail. Apart from such encroachments, discharging sewage (by Metro Water Department) into waterbodies, and dumping of garbage and construction debris on the waterbodies (by the Chennai corporation and municipalities) are continuing indiscriminately. These are major sources of pollution and blockage of waterbodies. Citizens too, wherever possible, have encroached the canals (thus making them narrow), and dumped household garbage and sewage into waterbodies leading to blockages. These acts has gone completely unregulated, with the Corporation and Municipality officials turning a blind eye to it.

The most worrying aspect is that Chennai is significantly ill prepared for the upcoming monsoon on the stretches we audited. Public Works Department (PWD) - responsible for the major drainage - and Chennai Corporation/ Local Municipalities - responsible for the minor drainage systems - remain non transparent about the plans, budgets and timelines before the upcoming monsoon.

The key recommendations and our demands from the Government are mentioned below.

Overall Recommendations:

- Public Works Department, Chennai Corporation and Municipal Administrations must immediately publish on their website the following: list of work undertaken for flood mitigation, their current status, tender documents and work order copies for the period between last December and the upcoming monsoon immediately. They should also publish timelines towards desilting of lakes/canals, storm water drains, widening of canals and the clearing of encroachments on waterbodies.
- In general, most channels have not been desilted for years and some decades. Silting contributes to 2 things – 1. The amount of silt formed is directly the equal to the volume of water discharged out of the waterbody 2. It also prevents water from seeping into the ground. Therefore, desilting is key to not only preventing the floods but also to recharge our ground water and make maximum use of the monsoon. Immediate desilting and clearance of other waste must be done by PWD on all waterbodies and major drainage channels.
- The Metro Water Department must come up with a clear plan, budget and timeline to achieve sewage treatment of all sewage generated in Chennai. Metro water and Sewage Board must first stop discharging untreated sewage into waterways. It must come

with clear mechanisms for violations and must take strict action against anyone discharging their sewage into the waterbodies.

- Chennai Corporation and Municipalities must find a lasting solution to city's Garbage and Construction Debris. Chennai Corporation's lack of political will to implement solutions for solid waste management like source segregation is taking a heavy toll on the city's waterbodies and contributes significantly to the constrained flow of the waterways as well as its quality. Chennai Corporation must come with a clear plan and action on how it will dispose the Construction debris of the city.
- PWD and CMDA must immediately release the GIS map of the Greater Chennai city recognizing all the waterbodies and waterways. Special status must be attributed to them disallowing conversion of those lands in the future. This will help Citizens and the Government prevent any future construction on the waterbodies and waterways. This map will also help citizens apply pressure on the officials to clear encroachments on the waterways.
- Our study clearly shows that Government Institutions and middle to upper class private residential houses are the biggest encroachers of the waterbodies and waterways. Encroachments of waterways must be dealt with strictly.

Key Recommendations for Specific Stretches

- Villivakkam lake must be restored immediately. The huge dumping of sand by Metro Rail and encroachment by Metro water Department inside the lake needs to be cleared. Storm Water Drains in SIDCO nagar require heavy desilting and Chennai Corporation should complete the work before monsoon
- Huge corruption appears to have taken place in the widening of Buckingham Canal from 20 metres to 100 metres under the JNNURM. This canal is the only drain for all the water collected in the Pallikaranai area. The non-completion of this work was one of the primary causes of flooding in the Pallikaranai area. Immediate

action must be taken on this corruption and the canal must be widened as per initial plan.

- Clearing of encroachments, clearing of garbage and widening of canal needs to be carried out in the waterway connecting Thirupananthaal lake to the Adyar river. The total neglect of this channel led to water overflowing from Thirupananthal lake flooding the entire area. This must be done on a war footing before monsoon 2016.
- For the Chrompet to Pallavaram Periya Eri canals, the culverts under the GST and under the railway tracks must be widened immediately. The encroachments that narrow the canal to less than 20 feet must be cleared immediately and garbage blocks need to removed. Pallavaram municipality must stop dumping garbage at the Pallavaram Periya Eri.
- The Mugalivakkam canal connecting the Airport land and the Adyar river has not been desilted for 15 years now. The silt formation is upto ground level and has resulted in heavy flooding of the area. Desilting of the canal along with removal of garbage and removing encroachments are key to making sure that the area does not see a repeat of last year floods again. The canal that is being closed near MGR house must be restored immediately.
- The canal connecting the Kilakattalai to Narayanapuram is heavily polluted with sewage, garbage and construction debris. Fresh encroachment in the form of a badminton court and the path to this court is coming up right on the channel - this needs to be cleared immediately. Discharging sewage into this channel by Metro Water and residents themselves must be stopped immediately. After ensuring that no sewage is mixed in the channel, the connection to the Narayanapuram lake must be re-established.

Introduction

This report is an outcome of the common citizen's effort to understand our waterways, the link these have with the floods in each area and the solutions required to both protect our waterbodies as well as to make the area flood proof.

In a democracy, citizens are masters. But, it really does not translate on the ground directly as citizens seems to have no role in governance except for electing their representative to the assembly or parliament. Voting once in 5 years is the only participation of the citizen in today's democracy. This can only be corrected by building coordinated groups by the citizens in each area to pressurize the elected representatives to act in the interest of the citizens.

The floods that Chennai saw in December 2015 was a big wake up call for everyone – Citizens and the Government. It was a message that the immense damage that we are carrying out on nature will hit us back if we don't take proper care of them. First, we must acknowledge that the flood is a result of a series of man-made mistakes over several decades and not a natural one. Centuries before, waterbodies and waterways were mostly constructed, controlled and maintained by the local community. This Community control over natural resources ensured that there was active participation of local people who primarily benefitted from the water resource. Therefore, there was a constant need to maintain it free of any encroachment or pollution as it was a lifeline to their livelihood. But this community control was lost and administration started getting centralized during the British Raj and more so after independence. Even though the smaller waterbodies are under the control of local municipal bodies, the local politicians have become the biggest threat, since they gain financially by selling the space on and around waterbodies.

A sustained social vigilance by the local residents is the need of the hour. An unprecedented number of citizens came forward for the flood relief work in December 2015. A sustained effort by such citizens to question and pressurize the Government requires, first, a reasonable understanding of

the state of affairs of the local waterbodies. This audit of waterways conducted by Arappor Iyakkam and Magasool, in which nearly 150 citizens participated across 4 stretches of waterways gave the citizens a first-hand understanding of the waterways around them and highlighted how they are being systematically damaged to serve certain vested interests. A lot of citizens shared their experience on how in spite of living so near a waterbody, they had no idea of the waterbody or waterway till that point. Direct auditing of waterways by local residents turned out to be the key to understand waterways. This audit, thus, provided huge motivation for them to continue working towards solving the problem in a sustained way.

Technology also plays a major role as GIS mapping of our waterbodies and comparing their status over time gives us a clear picture of the quality of damage done. With the Government very reluctant to part with their data, citizens have to form a consortium where technology experts and waterways expert can provide knowledge and directions to the citizens who have to continuously build a large vigilant community on the ground in each area.

Auditing of the waterways, questioning and petitioning the concerned authorities, getting official data through the Right to Information Act, carrying out public hearing on waterways, holding peaceful non violent protests, fighting the battle in the court through public interest litigations, exposing corruption in the waterways are all essential elements of a strong vigilant community. Citizens need to take ownership of their natural resources and public infrastructure and only such a strong socially vigilant community can turn around the state we are in today. This report is just the beginning of many such audits to come in the future.

Chennai, Kanchipuram and Thiruvallur district together originally had 3,600 waterbodies. According to Tamil Nadu's Water Resources Department (WRD), the area of 19 major lakes has shrunk from a total of 1,130 hectares in the 1980s to around 645 hectares in the early 2000s, resulting in reduction of their storage capacity.

We selected a few specific stretches that were significantly affected by floods. This report presents a detailed audit of these waterway stretches,

their history, their current status and the steps to be taken in order to ensure that a flood similar to what we saw in 2015 does not get repeated again.

Data Source

There is dearth of official information in the public domain relating to water bodies in Chennai. A database of waterbodies in Chennai should be created using GIS technology and made available in the public domain. Authorities should also make available plans with respect to maintenance, development, restoration, construction relating to the water bodies in public domain

The maps that we used for our preliminary studies are the 1954 map developed by the US on Indian waterbodies, 1972 official topo map and Google Earth for years 2001 to 2016.

Methodology

Preliminary research has been conducted based on the maps of 1954, 1972 and Google Earth. The elevation of different flood affected areas and the condition of the waterbody and the waterways around them were analyzed.

A sample of 4 areas that were heavily affected by floods in December 2015 were chosen. The idea of selecting a sample is to ensure that we can perform a detailed audit in a short time and, as a group, follow up to ensure solutions for the problems encountered. The four areas chosen were Villivakkam, Pallikaranai, Mugalivakkam and Pallavaram.

The areas and the key parts audited included the following:

- Pallikaranai Area
    - Okkiyam Madivu and Buckingham canal
    - Waterway connecting Keezhakattalai Lake to Narayanapuram lake
- Mugalivakkam and Manapakkam

    - Mugalivakkam canal connecting Airport Authority Land to Adyar River
- Pallavaram and Chrompet
    - Thirupananthal Lake, Inlets and Outlets
    - Chrompet to Pallavaram Periya Eri
- SIDCO Nagar, Villivakkam
    - Villivakkam Lake and Otteri Nallah
    - Inlets and outlets of Korattur Lake

After the preliminary analysis, detailed social audits were conducted in all the 4 areas. The following key parameters were looked at during the social audit. (Civic fulcrum, a technology group for urban bodies assisted with putting together an app to record these parameters during social audit)

- Width of the water body or drain at various points along its course
- Depth of the water body or drain at various points along its course
- Status of silt deposits on the water body bed
- Accumulation of garbage and debris in water channels and drains
- Unregulated dumping of garbage in the water body
- Effluents and sewage draining into water body
- Sewage flowing into storm water drains
- Breach in water channels
- Encroachments on water bodies and their banks

The measurements of width of canals carried out are in general approximate and not accurate except for Pallikaranai where satellite imagery was used to calculate width of canals and Mugalivakkam where digital metres were used. The final data has been analyzed and the inferences along with recommendations have been charted out in the report.

Villivakkam – SIDCO Nagar

Background

SIDCO nagar in 2015 floods

SIDCO nagar in Villivakkam was one of the heaviest flooded places in Chennai and the area continued to be deeply inundated for more than a week after the December floods. Villivakkam lake is one of the lakes that has shrunk in size greatly over the decades. In 1972, this waterbody was nearly 214 acres. GIS mapping of today's lake shows that only 20 acres is left.

But the lake is critical for recharging ground water and prevention of flood in the area. The overflow of the lake flows into Otteri Nallah which drains into the Buckingham canal. Over the years SIDCO Industrial Estate and SIDCO Nagar housing has come right on the lake shrinking it in size by

Villivakkam in 2013

Villivakkam in 2016

almost 80% over the last 3 decades. During the floods in 2005, most of the water drained into the lake and the area did not see a major problem. However, preliminary analysis of the GIS data now revealed that there is some significant encroachment going on in the lake over the last 3 years. Preliminary audit revealed that Metro Rail has been dumping its sand into the lake for the past 3 years shrinking the lake further.

Social Audit Observations

- The lake has been filled up with debris from Metro Rail construction over the past 3 years. The satellite imagery of the Villivakkam lake shows clearly that the lake has been filled up with construction debris over the past 3 years. In the social audit, it was clear that the construction debris has been piled up anywhere between 10 to 20 feet above the ground blocking the inlets into the lake.

Villivakkam lake filled with Metro rail debris

- Metro Water Department is in control of the lake and has built their pumping stations inside the lake. The old pumping station is not under use and there is a new pumping station coming up right on the lake.

- The Villivakkam lake's level is the lowest of all the surrounding areas with an altitude of 11 to 12 m above sea level. So until a few years back the natural drainage which was into the lake from all the surrounding areas has been disturbed now by the Metro water encroaching over the lake area for construction of pumping station and Metro rail

filling the lake with debris. This led to the heavy flooding of the neighbouring SIDCO Nagar and South Jagannatha Nagar.

- Apart from this, sewage/industrial waste from the Padi and TVS side is discharged into the otteri nallah drain without any treatment
- SIDCO Nagar has 7 wells dug by Chennai Metro Water. All 7 are abandoned now. One of the wells and the adjacent land is used by Chennai Metro for official purposes but other wells remain as garbage dumping areas. SIDCO Nagar association residents want the excess rain water to flow into the wells so as to recharge ground water. They also wantthe land adjacent to be used as part of a walkway. Their suggestions have not yielded any results as the officials continue to ignore it

Condition of Storm water drain on 2nd main road

- The natural macro drainage for the area has been replaced with micro drainage through the storm water drains by the corporation which turned out to be completely ineffective during the floods

- Storm water drains (SWD) of the entire area including SIDCO Nagar and South Jaganatha Nagar were audited. The storm water drains were in terrible condition during the floods and water didn't flow through it. Even now, the storm water drains are completely choked up with silt, garbage and debris at many places. They have also been encroached by shops at some places. Here is a list of all points on SWDs in SIDCO Nagar
  - 2nd Main road: Storm water drains

Social audit by volunteers

(SWD) are available on either side, measuring 6 feet and 4 feet deep, encroached by shops

- The storm water drains are open at many places in SIDCO Nagar leading to dumping of debris and garbage.
- SWD situated opposite the sewage pumping station is filled with debris
- SWD situated near the sewage pumping station is damaged
- The SWD in the industrial estate is 4 feet wide, it is damaged and filled with debris
- In Lake (L3) road there are no SWDs
- 54th street: SWD on the right hand side is 4 feet wide and 2 feet wide on the left hand side
- Near the church: SWD on the right hand side is 2 feet wide, encroachments near the end
- In Nehru nagar, there are no SWDs
- SIDCo Nagar 4th main road has a lot of encroachments on the SWD
- Near railway track, there are 6 water pipes that enter SIDCO nagar but there is no channel to carry this water further to the lake or the storm water drains

Unused well of the Metro water

- There are no SWDs in Arignar Anna street
- North Jagannathan railway track: Old drain canal has been closed after construction of side wall near the track
- No flow of water between North and South Jaganathan streets, 4 feet of stagnant water was removed 10 days later through pumping.
- In South Jagannatha nagar, 61st street, SWD is of width 3 feet and 2 feet depth and has not been desilted for 10 years. During floods, water stagnated to a height of 3 feet for 15 days.

  - In the 54th, 56th, 57th, 58th, 62nd, 63rd and 65th streets, there are no SWDs.
  - In 61st main road, water stagnated to a height of 4 feet for 10 days
  - In the SIDCO nagar 9th main road, sewage manhole closed by road. SWDs are available only on half of the road
  - On examination of one SWD in SIDCO nagar, 3rd main road, it appeared like a sewage channel and if not cleared will not serve the purpose during rain.
  - In the Industrial region where all the storm water channels exit SIDCO Nagar, the channels were filled with garbage blocking the water flow. Unless this block is not cleared, the rain water in entire SIDCO Nagar cannot be cleared.
  - SWDs are clogged with encroachments and blocking water from Ambattur and mosque side

- The Korattur lake near Villivakkam lake was also audited. The east side of the lake is well secured with bund and platform; whereas west side is left open and is prone to encroachment. At the North east side, there is a madhagu that takes excess water to Retteri lake. At the southern side, the lake is polluted by effluents from Aavin production plant

Korattur lake

Recommendations

- Metro rail debris has to be removed from Villivakkam lake and lake need to be restored on a very high priority.
- Strict action must be taken on the officials who allowed dumping of metro sand into the lake.

- The macro drainage system of Villivakkam lake needs to be restored as it has the capacity to drain water during floods as well as recharge ground water for the area
- The inlets into the lake from different parts needs to be properly channelized. Also, the 6 pipes through which water gets into the SIDCO nagar across the railway track has to be channelizes into the lake.
- Roads need to be laid in such a way that the water naturally flows in to the lake from surrounding areas.
- All the storm water drains in SIDCO Nagar and South Jagannatha Nagar need to be desilted, cleared of debris and garbage immediately before monsoon.
- All the open storm water drains need to be covered. Local public need to be sensitized about the importance of keeping the storm water drain free flowing, because some private home owners and shops are dumping sand bags and stones to stop water from coming to their side.
- The abandoned wells of Metro Water Department should be cleaned and maintained properly. Thesecan be a good source for recharging water in the area as well as prevent floods. The local community is ready to participate in the maintenance of the well and they must be involved in the process.
- The encroachments on the Storm water drains at the intersection of SIDCO Nagar entrance and New Avadi Road must be removed immediately.
- Directly discharging of sewage flow into the Villivakkam lake must be stopped immediately. Proper sewage treatment must be done before discharging of sewage into any waterway.
- The sewage discharge in the canal coming from TVS side into the canal must be stopped immediately.
- Otteri Nallah has to be desilted completely
- Encroachments inside Villivakkam lake need to be removed.
- Stop Aavin's effluents from polluting Korattur Lake. secure boundary at west side of Korattur lake to ensure there are no future encroachments.

Pallikaranai and surrounding areas

Background

The Pallikaranai - Velachery stretch was one of the most affected during the floods. The primary reason for this is that the entire area is only 0 to 2 metres above sea level and water from all other lakes run down the gradient into the Pallikaranai Marsh. The area is not suitable for residential development and lack of any urban planning over the last 2 decades is hitting the residents significantly now. Also, over the years the marshland has been heavily encroached and polluted. The huge garbage dumpyard has polluted the marshland heavily.

Elevation map of places from Pallavaram to Pallikaranai

As can be seen from the map, the Pallavaram Periya Eri is situated at 17 m above the sea level, Keelkattalai lake at 7 m above sea level and Narayanapuram lake situated at 1 to 2 m above sea level. So during rains all the water from surrounding areas lands up quickly near Pallikaranai and Velachery which is just above sea level. From the Pallikaranai Marsh, the only outlet into the sea is through the Okkiyam Madivu which leads into the Buckingham canal that reaches the sea at Muttukkadu.

Since there is no gradient from Pallikaranai to the sea, water flows slowly into the sea after travelling for around 15 Kms through the Okkiyam madivu and Buckingham canal. In order to ensure faster flow of water during the floods, the Government decided to expand the Buckingham

canal stretch from Okkiyam Madivu to Muttukkaadu from 20 metres to 100 metres at a cost of 78 crores under the JNNURM scheme. The budget was exceeded and nearly Rs.104 crores has been spent on the expansionbetween years 2010 to 2013. The CAG noted in 2014 that out of the 13 Km stretch, 5.4 Kms have not been extended even after spending 104 crores. The CAG clearly warned that Pallikaranai area is completely unprepared for the floods in 2014 itself due to the incomplete works.

The social audit of waterways focused on the Okkiyam Madivu and the Buckingham canal that enters the sea at Muttukkaadu. The connecting waterway from Keelakattalai to Narayanapuram was also audited.

Social Audit Observations

Outlet from Pallikaranai Marsh into the sea

- Garbage from small industries, houses and a small paper industry are all dumped in the Okkiyam Madivu stretch near Thangavelu Engineering College.
- Sewage from the surrounding areas is also let directly into Okkiyam madivu without treatment at the OMR Okkiyam Madivu intersection
- While one side of Okkiyam Madivu is reasonably maintained, the other side does not even have approach road. The KC tech college's walls prevent accessing one side of the Okkiyam Madivu.

Okkiyam Madivu-Buckingham joining point

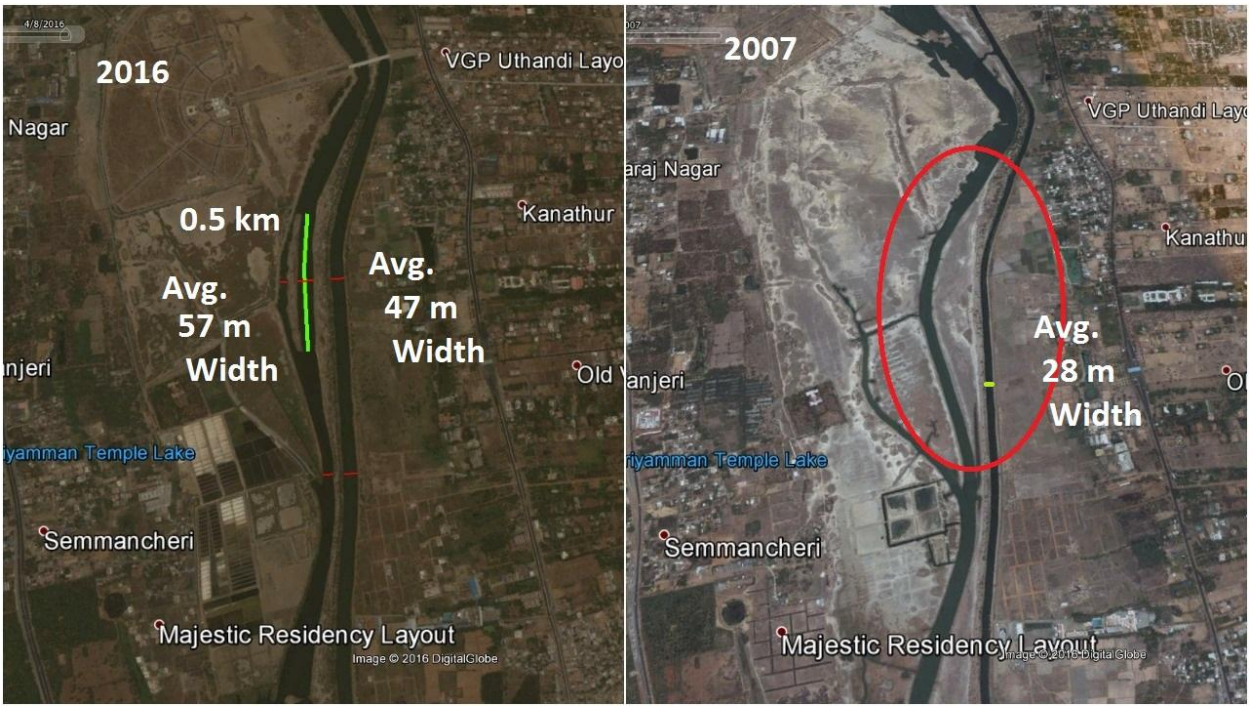
- The first stretch of 2.4 Kms from the end of Okkiyam Madivu to Sholinganallur bridge is the only place where actual widening of Buckingham canal has happened for a width of upto 100 m as per JNNURM scheme.
- The point where Okkiyam Madivu joins Buckingham canal is very narrow and there is a lot of scope for extension
- Widespread growth of hyacinth

covering the canal completely at the mouth and at different places thereafter all the way up to Sholinganallur bridge.

- 2.4 Kms from the starting point, the Buckingham canal has a big bund running in the middle, for a length of 10 km, parallel to the banks that has not been cleared at all. The canal has been extended only for a width of 19 m on average along this entire stretch. On one side of the bund the width was earlier around 24.5 m which has now become around 44 m.

After 2.4 Kms, the bund in between remains

- On this stretch, the depth of the canal is believed to be much less than optimal. Local residents informed that the PWD only dredged the two ends of the canal forming a bund in the middle which has not been cleared. The canal supposedly is 12 ft deep only at the ends and not throughout as it ought to be.



Comparison of 2016 and 2007 – The right side canal has been widened from 28 m to 47m. On the left there is very little work done for 0.5 Km alone in this entire 2.5 Km stretch

- On the other side of the bund, very minimal work has been carried out. There are just a few places where expansion has been carried out. The depth of that canal is also supposedly only 4 feet according to local residents.
- Overall, out of the 13 Km stretch our analysis and social audit concluded that the expansion from 20 m to 100m has happened only for a stretch of 4 Kms and that along the other stretches, it has been widened from around 25 to 45 metres at the max. This was clearly established by looking at the maps of 2007 and 2016 and comparing their widths.
- There is a lot of garbage that is being dumped on one side of the canal behind Mayajaal and this is turning into a new dumping yard.
- The width of the Buckingham canal at the Indian Maritime University is very narrow. A portion of the canal has been taken over by the University by building a compound wall boundary.

Volunteers during social audit in Pallikaranai

- At the Muttukkaadu , the debris of the new flyover construction has been put up right under the flyover where the Buckingham canal enters the sea. This contributes to blocking the flow of water in both directions in the backwaters.

Kilkattalai lake to Narayanapuram lake

- The areas around the 3 Km channel connecting Kilkattalai to Narayanapuram lake were heavily flooded last time due to the overflow in the channel.

- Except for the initial 100m stretch the water way has been heavily encroached on the side by private residential houses reducing the original width of 60 feet of the channel to anywhere between 15 to 40 feet at most places.

Metro water's pipeline into canal to discharge untreated waste

- A buried sewage outfall pipeline was detected immediately after the overflow weir. Some of the locals indicated that sewage was being pumped from the Pallavaram Municipality's sewage pumping station located bang adjacent to the lake. This pumping station pumps the sewage through a pressure main, along the 200 ft radial road, directly to the STP at Perungudi. It is understood that the residents of Engineers Avenue Residents Welfare Association (EAWRA) in 2014 had complained to the commissioner municipality, PWD and the CM cell on this issue. The authorities had admitted 'in writing' to the design faults and had carried out modifications in the pipeline. They had also agreed to stop any discharge of sewage into the surplus channel and removal of this hidden sewage outfall. However, the presence of the pipeline and information gathered from the locals shows this is being flouted.
- Further down, sewage from a large apartment complex (Naveen's flats) was being discharged into the surplus channel.
- Further down a storm water drain from the town of Nanmanglam joins this surplus channel.

At radial road intersection

- Further down a drain valve arrangement has been provided by the municipality for possible draining in case of any emergency. This was reported to be used rarely.
- The channel then cuts across the 200 ft radial road towards south and then

turns east and flows under the bridge on Medavakkam High Road, at the kilkattalai signal. It isobserved that sewage flowing from the storm water drain along the Medavakkam High road gushes into the surplus channel near the bridge. The sewage is possibly from Pallavaram municipality and/or Moversampettai panchayat. A complaint on this has also been filed EARWA and the same acknowledged by the municipality stating that the sewage is from Moversampettai.

- The entire stretch is clogged with garbage, construction debris and heavy encroachment. At the intersection of the arterial road, the situation is even worse as can be seen in the figure above. There is also silt formation and it has been several years since desilting.

Encroachment on right and flow in the middle blocked by garbage and debris

- The width of the channel at the bridge is round 50 feet and thereafter progressively narrows down. Several encroachments are observed including houses, a temple and a church. The width of the channel reduces to 20 feet in many places after Arul Murugan Nagar.
- The width of the channel increases to around 50 feet near Engineers Avenue, Unmai Nagar. Here too construction of flats and compound wall right adjacent to the south side of the channel is seen. There is no motorable road adjacent to the channel on the south side but is available on the north side, indicating that the south side of the channel has several encroachments.
- The channel flows across the Dr Ambedkar Salai and flows under the bridge. The width of the channel is about 50 feet under the bridge. The depth of the channel is about 6 feet here and is full of water whereas the water is stagnant to more than a feet. This shows the depth of the channel is maximum here and the levels

across the channels needs to be corrected to ensure complete draining and emptying out of flood waters.

- The channel here is completely covered with weeds showing desilting has not been done and the water has undergone eutrophication due to sewage influx.
- However, immediately thereafter the channel makes 90 degree turn (behind a car mechanic shop). The 90 degree turn of the channel indicates this is not the natural course and is caused by encroachments.
- Thereafter the channel narrows down to 20 feet or less and a katcha road has been laid with debris right across the channel near a badminton club cutting of the channel completely, near LIC nagar.
- Thereafter the channel flows adjacent to the Narayanapuram lake, the entry into the lake is completely blocked by construction of an earthen bund along the boundaries of the lake. This is reportedly done to avoid sewage inflow into the lake and contamination of the drinking water wells of the Kovilambakkam panchayat. A temple, bang on the channel, has also reduced the width of the channel along the lake.
- The channel then is connected to the storm water drains along the radial road using earthen bunds by turning it from its eastward direction to south and then eastward again, and flows under a corporation of Chennai (COC) Bridge, and joins the storm water drain along the radial road. It is reported by the locals that water does not change its course during heavy rains and floods and actually continues its original eastward path due the level difference of the storm water drain and channel (the storm water drain is almost 6 feet higher). This results in flooding of the LIC Nagar area. Water flows along its natural gradient (instead of climbing up to the storm water drain along the radial road) through the patta lands and joins the marsh during the floods.
- The width of the storm water drain is less than 20 feet in most places. Most areas the width is considerably reduced due to construction of private bridges connecting the nearby localities like

LIC Nagar to the 200 ft radial road. The width of the channel is less than 10 feet in many locations.

- It is clear that the width of the channel is reduced from 60 ft to 20 or 30feet along the 3 KM stretch and there is a level difference along the channel which needs to be corrected. Serious encroachments particularly after the Ambedkar Salai has cut off the channel completely.

Recommendations

- Overall, out of the 13 Km stretch of the Buckingham canal, our analysis and social audit concluded that the expansion from 20 m to 100m has happened only for a stretch of 4 Kms and that along the other 9 Kms, it has been widened from around 25 to 45 metres only. There is a large misuse of public money that has happened.The Government must immediately make steps to widen the mouth of Okkiyam Madivu. The canal must be widened immediately as was planned in the South Buckingham canal extension work as part of the JNNURM flood prevention program.
- The hyacinth (even though has a positive side of absorbing poisonous chemicals) also hinders the flow during floods. So at the mouth of Okkiyam Madivu connecting Buckingham canal, it is necessary to remove the weeds.
- The corruption in executing the South Buckingham canal widening program must be enquired with immediately. Action must be taken on the PWD officers and contractors responsible for this mal-administration and corruption.
- The people dumping garbage along the Buckingham canal must be immediately identified, punished and steps must be taken to stop dumping. Garbage and debris should be removed from the place.
- At Muttukkaadu, the construction of flyover has resulted in construction debris being dumped directly into the backwaters, leading to a blockage of flow into the sea. This must be cleared before the monsoon.

- The desilting, garbage removal, hyacinth removal and construction debris removal in the channel connecting Kilkattalai and Narayanapuram needs to be done over the entire stretch immediately
- The sewage that is being discharged into the channel by private residential complex and the Metro Water Department must be stopped immediately.
- After ensuring that there is no sewage in the channel, the channel must be connected into the Narayanapuram lake. Else, there needs to be a channel constructed that connects LIC Nagar into the Pallikaranai Marsh along the natural gradient.
- The water hyacinths in the Narayanapuram lake need to be removed to increase water holding capacity of the lake balancing it with an eye of maintaining the water purifying abilities of the plant.
- The Temple and the Badminton court that is built in the channel near the entrance of Narayanapuram lake needs to be removed. All the encroachments along this channel that have decreased the channel from 60 feet to 20 or 30 feet must be cleared.

Mugalivakkam

Background

Mugalivakkam area was heavily flooded during December 2015. The water filled in all the three basement levels of DLF.The area was completely flooded and remained inundated for more than a week. There is a canal that starts at the Airport Authority land and runs near DLF, MIOT and joins the Adyar river. This channel flows through Sabari Nagar, AGS colony, DLF, L&T, Crossing at Mount - Poonamallee road and adjacent to Ramapuram MGR Thottam and crossing the road going towards Ramapuram Aalamaram and then joins the Adyar river near MIOT. The Canal was built with an agreement between Panchayat and AAI that Panchayat need to pay certain amount annually, but the

Panchayat defaulted in payment. AAI decided to close it because of non-payment and the canal inside was reduced to 4 ft and that was blocked by dumping debris

Social Audit Observations

- The original width of the canal is 50 to 60 feet. However, in most places the width is reduced to 15 to 40 feet and the actual water flowing width is reduced to anywhere between 3 to 30 feet.
- The entry point was closed by AAI so there is no provision for water going through AAI canal after the December 2015 flood.
- After the Panchayat of Mugalivakkam was attached with Chennai Corporation, a SWD measuring 3 feet by 3 feet was built to divert the water outside AAI canal
- The water inflow is huge in the street and outflow is very low. The storm water drain constructed is suitable for low level of rain fall. If the rain continues for 2 days the water will overflow

Mugalivakkam canal near sabari nagar filled with silt

- Number of small size storm water drains of insufficient capacity, ranging from 2 feet to 4 feet are present
- At the outlet of AAI canal, a 40 feet cross over culvert has been reduced in size to 24 feet and completely filled with garbage and debris leaving about 8 feet for water flow
- The canal comes through DLF, L&T colony crosses & Mount Poonamallee Road, its size starts with 50' then gradually reduces to 30' then subsequently reduced to 20' owing to silt and garbage.
- The silt formation at most places is until the ground level and this has led to the water flowing into the streets and households during last monsoon. This canal has not been desilted for more than 15 years according to the local residents.

- At Mugalivakkam Main Road, where the Canal going under bridge, around 45 feet is the actual width whereas only 8 feet are in usable state. Other areas are dumped with garbage, fallen trees, vegetation and encroachments
- In few minutes' walk the width reduced to 36 feet, (waste paper shop and adjacent shops have encroached sideways of the canal space. Opposite to Corporation Park, two houses adjacent to canal encroached 8 feet (extended their compound wall).
- Immediately after this, there is a dyeing unit discharging untreated water into canal
- At TV Nagar Main Road, the canal is encroached by a drinking water processing company. 8 feet lengthy pipes are kept under the bridge. It stalls and all the garbage piles up over there.
- Near DLF, on ATM Street, the water flow is very slow and lot of garbage is dumped on this part of the canal.
- After crossing the road, before MIOT, in front of the Late MGR's r

Canal choked with garbage

Canal being closed down with sand near MGR house

storm water drain of size 6' X 6' X 6' is under construction.

- The existing canal which is more than 30 feet wide is currently being closed and instead canal is diverted to the small drain constructed.
- Then the canal continues till the cross of Ramapuram road and there is a culvert which acts as a bottle-neck for water outflow. The height of the culvert needs to be increased

- At many places, canal's width had been reduced by few feet by encroachments which would act as Bottle-neck for the flow of water, -- that could lead to water flowing out of canal, if lake water is opened for draining. Many apartments have built their compound walls encroaching into the canals
- In Adyar River at Ramapuram behind MIOT Hospital, the canal is a sand canal up to MIOT hospital and at MIOT its size is 12' x 12' and built with concrete, but silt accumulation impedes water flow and the usable width is reduced to just 8 feet

Recommendations

- The blockage wall which has been built on the right side of the Mugalivakkam Main Road needs to be removed immediately
- The encroachments on Mugalivakkam Main road and opposite to Corporation park must be removed. The encroachment by private residential buildings and apartments throughout the canal needs to be removed and the canal should be widened to its original width.
- Near MGR house, the closing down of the wide canal and instead putting a small storm water drain is a serious issue. Even after facing such a flood, the Government's closing down of the canal only reflects the continuing insensitivity. The canal must be retained back.
- The entire channel has not been desilted for more than 15 years. Before the monsoon, desilting of this entire channel is mandatory on a priority basis before monsoon to prevent flooding of this area.
- The growth of vegetations throughout the canal has reduced the waterflow width to 3 to 8 feet at many places. The vegetations needs to be removed immediately
- The garbage and debris on the canal is blocking the flow of water completely. They must be removed immediately.

- Canal covers only certain streets which is adjacent to canal, rest of the places there is no way for the water to reach the canal. Eg: Sri Lakshmi Nagar, Krishnaveni Nagar, AGS Colony other areas, Arasamaram, etc.
- Local Storm water drainage capacity needs to be increased since the existing canals and new canals being laid are not sufficient to tackle heavy rains
- Near MIOT hospital, the size of the concrete canal of 12 x 12 feet need to be increased to 30 to 40 feet
- The boundaries of the canals must be secured by clear markings.

Pallavaram & Chrompet

Thirupananthaal (Pammal)

Background

The places surrounding Thirupananthaal lake were flooded heavily. Thirupananthal lake is situated in Krishna Nagar, Pammal near Pallavaram. The lake has been heavily encroached over the years and reduced more than 80% over the last 4 decades. This lake is critical both for water storage as well as flood prevention as this is one of the few remaining lakes in the area apart from Sooriyamman lake. Many lakes such as Moongileri have been filled up by the Government and housing units have been built on top of it.

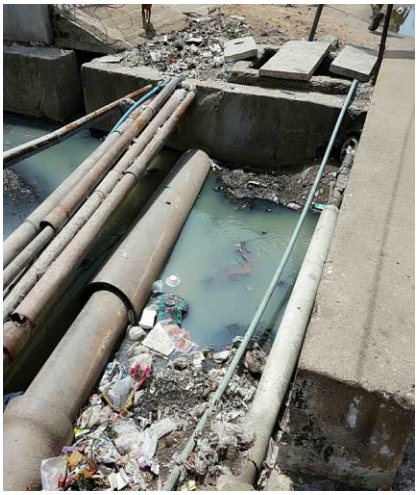
Tirupananthal lake's overflow used to drain into Periya Eri of Pallavaram as per 1972 map. However that connection has completely vanished and Tirupananthal lake's overflow drains into Adyar river through a channel of original width of around 50 feet. There is another channel at the middle of the lake in the northern side that joins with achannel near the Pammal main road. There are three channels from Sooriyamman temple pond that join the Thirupananthal lake on the western side.

Social Audit Observations

Thirupananthaal lake

- The outlet from the Tirupananthal lake into the channel at the north east of the lake is completely choked up with Garbage. Plastic waste is blocking the flow of water into the channel.

- The entire Channel has been heavily encroached by builders and private houses beyond their approved plot sizes shrinking the channel to anywhere between 4 to 6 feet at the first 50 metres of the outlet.
- The entire community in Krishna Nagar has no drainage system through the Chennai Metro Water and Sewage Board. As a result of it, all the sewage from households are discharged directly into the channel at different points.



Metro water lines across canal

- The Channel is completely choked with silt, plastic waste and garbage affecting the flow of water significantly.
- Further down the stream, the encroachments are so rampant that the constructions are right on the Channel at the intersection of Krishna Nagar and Pammal main road.
- After crossing the Pammal main road, the Channel expands to around 40 feet. This is completely filled with silt, sewage and garbage at different places. The drinking water pipe runs across the channel.
- This channel reaches a small pond at Anandan Street, Pammal. However, the pond is being filled up currently with construction debris to close down the channel and the pond.
- The channel ends here and the overflow from here is diverted into 2 very small channels of 2 to 3 feet wide and 4 to 5 feet depth. The condition of these two channels is extremely poor choked with sewage and garbage with no maintenance.
- These two channels proceed futher and join the Adyar river near the airport at the Cowl bazar main road.

Canal flow blocked with garbage near Cowl Bazar

Recommendations

- Widening of channels by clearing encroachments needs to be carried out immediately.
- Garbage dumping to be stopped and existing garbage to be cleared
- Desilting of channels needs to be carries out immediately
- Separation of drainage and storm water channels to be undertaken
- The small pond near Anandan nagar that is being filled in currently should be restored immediately

Chrompet to Pallavaram Periya Eri

Background

GST Road during floods
near Chrompet police station

On the GST road near Chrompet, there was heavy flooding in December 2015. The road is flooded almost every monsoon. The audit looked at the channels connecting the Chrompet area to the Pallavaram Periya Eri. The canals connecting into the Periya Eri used to have original width of anywhere between 30 to 60 feet originally.

Social Audit Observations

- There are two major water channels that connect the west side of Chrompet to the east side at Pallavaram Periya Eri. The natural gradient is from the west to east of GST road and any blockage in these canals connecting the west and east results in flooding of the area.

GST Road canal near police station

- All the storm water drains from west side of Chrompet such as New Colony, Chambers Colony and Nagalkeni flow into the following channels. 1. Channel starting opposite to Chrompet police station on the east of GST Road 2. Channel starting opposite to Chrompet General Hospital on the east of GST road.
- The culverts of the storm water drains that cross the GST road opposite to Chrompet GH and

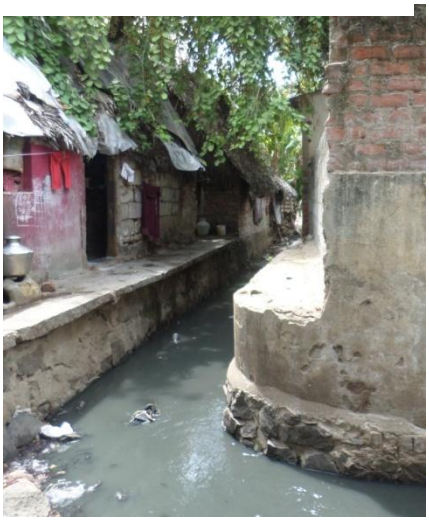
also opposite to Chrompet police station are very shallow and the width is very narrow

Culvert under the railway track

- These 2 channels cross the railway tracks by way of 3 to 4 feet culverts. Other water pipelines and cables also pass through the same culverts. These 2 channels join at Shanti Nagar in Chrompet on the east and this canal into Periya Eri at Pallavaram.

- The channel that runs opposite to Chrompet GH, cross the railway track and runs through the Madras Institute of Technology. At the exit point of the MIT wall, there is a Durgaiamman temple built right on the channel at Station road, Radha Nagar.
- After this, the channel is encroached by a street and around 30 to 40 shops narrowing the channel to around 15 feet.
- This channel then joins at Shanti Nagar near EB office.
- The Channel starting opposite to Chrompet police station crosses the railway track and runs into Shanti Nagar where it has been encroached by a street road and the leftover narrow channel has been converted into a covered storm water drain

At Kattabomman cross street



- This Channel then goes into Kattabomman street it is heavily encroached by houses and the channel is reduced to around 7 feet width. This is further reduced to 3 feet at Kattabomman Cross street where a house on patta land has encroached into the water channel

- The narrow width then expands into 10 to 12 feet and reaches the Pallavaram Periya Eri. The Pallavaram Periya Eri on the Chrompet side has been heavily encroached (about 70%) by residential houses and the Pallavaram Municipality uses 20% of the Eri as a garbage Dumping yard

Periya Eri dumpyard

Recommendations

- Culverts under the GST Road at the Chrompet GH point and the Chrompet police station point must be widened to atleast 10 to 15 feet and deepened to 10 feet in order to carry the volume of water from the west side to east side of Chrompet.
- The culverts under the railway track must be widened to 10 to 15 feet and 2 more culverts should be built under the railway tracks to carry heavy volume of water.
- All the encroachments narrowing the canal including the temple must be removed immediately.
- Desilting and removal of garbage along the entire stretch of channels must be done immediately.
- The municipality has tried to raise the bottom level of the water channel at a few places by using concrete. This should be avoided in the future as it will prevent free flow of water as well as prevent ground water recharge.
- The Palavaram Municipality must immediately stop dumping of solid waste into the Periya Eri. The encroachment in the lake must be cleared and bunds must be formed around.

Conclusion

The social audit of different waterways has thrown up many issues that are common. The issues of sewage being discharged into waterways without treatment, garbage and construction debris being dumped into waterways are all common across different waterways. Secondly, silt formation is major cause of worry and it has been many years since most of these channels were desilted. Thirdly encroachments by Government and unregulated encroachments by private residential buildings and apartments have narrowed the width of the canal significantly across all channels leading to overflow of water into the surrounding areas. The shrinking of waterbodies and abandoning it completely like Villivakkam has been a major cause of worry. Corruption in waterbodies is easier as it is difficult to measure the depth and width of waterway dredged. Monsoon can be a wonderful opportunity to save water, raise our ground level if the waterbodies and waterways are desilted and maintained to its capacity. This could also prevent floods significantly. It is worrying that no action or very limited action have taken place on the ground since last monsoon. It is more worrying that canals like the one in Ramavaram and lake such as Villivakkam are currently being shut down in spite of what happened last December. It requires a strong political will to make Chennai flood free and water resourceful. Our Recommendations and Demands from the Government include

- Public Works Department, Chennai Corporation and Municipal Administration must immediately publish on their website the list of work undertaken, their current status, tender documents and work order copies along with timeline towards desilting of lakes/canals, storm water drains, widening of canals, clearing of

encroachments on waterbodies between last December and the upcoming monsoon immediately.

- In common, most channels have not been desilted for years and some decades. Silting contributes to 2 things – 1. The amount of silt formed is directly the equal to the volume of water discharged out of the waterbody 2. It also prevents water from seeping into the ground. Therefore desilting is key to not only preventing the floods but also to recharge our ground water and make maximum use of the monsoon. Immediate desilting and clearance of other waste must be done by PWD on all waterbodies and major drainage channels.
- The Metro Water Department must come up with a clear plan, budget and timeline to achieve sewage treatment of all sewage generated in Chennai. Metro water must first stop discharging untreated sewage into waterways. It must come with clear mechanisms for violations and must take strict action against anyone discharging their untreated sewage into the waterbodies.
- Chennai Corporation and Municipalities must find a lasting solution to city's Garbage and Construction Debris. Chennai Corporation's lack of political will to implement solutions for solid waste management like segregation is taking a heavy toll on the city's waterbodies and contributes significantly to flow of the waterways as well as its quality. Chennai Corporation must come with a clear plan and action on how it will dispose the Construction debris of the city.
- PWD and CMDA must immediately release the GIS map of the Greater Chennai city recognizing all the waterbodies and waterways. Special status must be attributed to them disallowing conversion of those lands in the future. This will help Citizens and the Government prevent any future construction on the waterbodies and waterways. This map will also help citizens apply pressure on the officials to clear encroachments on the waterways.
- Our study clearly shows that Government Institutions and middle to upper class private residential houses are the biggest

encroachers of the waterbodies and waterways. Encroachments of waterways must be dealt with strictly.

- Villivakkam lake must be restored immediately. The huge dumping of sand by Metro Rail and encroachment by Metro water Department inside the lake needs to be cleared. Storm Water Drains in SIDCO nagar require heavy desilting and Chennai Corporation should complete the work before monsoon
- There is a huge corruption that have taken place in the widening of Buckingham Canal from 20 am to 100m under the JNNURM which is the only drain for all the water collected in the Pallikaranai area. This non completion of work was one of the primary cause of the flooding of the pallikaranai area. Immediate action must be taken on the corruption and the canal must be widened as per initial plan.

A 51 crore PWD scam on Buckingham canal. Who is Accountable ?

Type	PWD's original estimate	PWD's revised estimate
Total budget	780000000	1040000000
Length of the canal in metres	13000	13000
Total width to be widened (in metres)	80	80
Total sq.m to be widened (length*width)	1040000	1040000
Budget Estimate per sq.m (total budget/total sq.m)	750	1000
For 4.5 Kms,80 m has been widened. Work done in (sq.m) - A	360000	360000
For 8.5 Kms, only 20 m has been widened. Work done (sq.m) - B	170000	170000
Total workdone in sq.m (A + B)	530000	530000
Total actual expenses for the work done (Total workdone in sq.m * Budget estimate per sq.m)	397500000	530000000
Public Exchequer money Swindled (Total budget - Actual expenses)	**382500000**	**510000000**

- Clearing of encroachments, Garbage and widening of canal needs to be carried out in the waterway connecting Thirupananthaal lake to the Adyar river. The total neglect of this channel led to water overflowing from Thirupananthal lake flooding the entire area. This must be done on a war footing before monsoon

- For the Chrompet to Pallavaram Periya Eri canals, the culverts under the GST and under the railway tracks must be widened immediately. The encroachments that narrows the canal to less than 20 feet must be cleared immediately and garbage blocks needs to removed. Pallavaram municipality must stop dumping garbage at the Pallavaram Periya Eri.
- The Mugalivakkam canal connecting the Airport land and the Adyar river has not been desilted for 15 years now. The silt formation is upto the ground level and has resulted in heavy flooding of the area. Desilting of the canal along with removal of garbage and removing encroachments are key to making sure that the area does not see a repeat of last year floods again. The canal that is being closed near MGR house must be restored immediately.
- The canal connecting the Kilkattalai to Narayanapuram is heavily polluted with sewage, garbage and construction debris. Fresh encroachment of badminton court and path to it is coming up right on the channel which needs to be cleared immediately. The discharging of sewage in the channel by metro water and other residents must be stopped immediately. After ensuring that no sewage is mixed in the channel, the connection to the Narayanapuram lake must be reestablished.